

CRUISE REPORT

Southeast Fishery-Independent Survey (SEFIS)

NOAA Ship *Nancy Foster* Cruise NF-10-15-Leg 2
26 September – 9 October 2010
Total Number of Days At-Sea - 14

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Beaufort Laboratory
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Beaufort, NC 28516

32 ROV dives
17 CTD casts
16 areas mapped

INTRODUCTION

The NOAA Ship *Nancy Foster* departed Charleston, SC, on 14 September 2010 to initiate a Southeast Fishery-Independent Survey (SEFIS) research cruise in continental shelf and shelf-break waters off the southeastern US.

SEFIS was created by the National Marine Fisheries Service in 2010 and operates out of the Beaufort Laboratory. This survey was created to conduct applied fishery-independent sampling and related research focusing on the assessment of spatial variability in distribution and abundance of red snapper and other reef species within the snapper-grouper complex, via data collected from fish traps, video cameras, and acoustics. During this survey, the primary activities were remotely operated vehicle (ROV) dives during the day and habitat mapping at night. A total 32 ROV dives were completed between 29.2 °N and 32.4 °N, over 14 days at-sea between 17 and 66 m depths.

OBJECTIVES

1. Survey reef fish assemblages and identify bottom habitats using a deep-water ROV equipped with instrumentation including low-light digital video and DIDSON sonar.
2. Use a CTD instrument package to collect information on water quality parameters (temperature, salinity, dissolved oxygen) at ROV sampling locations.
3. Map bottom habitats using multibeam sonar to improve survey design and to expand knowledge of hardbottom habitats in the southeast US.
4. Use fisheries acoustic gear (split-beam and DIDSON sonar) to assess its use as a fishery-independent survey tool.
5. Collect sponge samples using the ROV for use by collaborating researchers assessing oil contamination.

METHODS

ROV Sampling

ROV dives were conducted with a deep-water ROV (Super Phantom S2). Dives were focused in shelf-edge waters (45-65m depths) at the seaward margin of the southeast US continental shelf off SC, GA and FL (see Figure 1). Video from ROV will be used to identify and quantify reef fish seen, describe habitat, examine for effects of Marine Protected Areas (MPAs) on fish distribution, and document changes in reef fish (including lionfish) abundance and community metrics over time.

Environmental Data Collection

Environmental data were collected with Seabird CTD model SBE 9 and Scientific Computer System (SCS) software. CTD casts were conducted periodically during multibeam mapping. Numerous water profile parameters were collected, including temperature (°C), salinity, and dissolved oxygen (mg/L). CTD data were archived for further processing at the Beaufort laboratory. SCS software (version 4.2) was used to collect specific information for each ROV and CTD event, including start latitude, longitude and depth (m).

Acoustic Data Collection

Multibeam acoustic data collection: The *Nancy Foster* multibeam unit (Kongsberg-Simrad EM 1002) was typically used to map benthic habitats during nighttime hours. Areas for mapping were selected based on the need for additional hardbottom sampling sites in an area, information from fishermen, and efficient use of vessel time. Raw multibeam data were processed by the ship's survey technicians each morning, and these hardbottom habitat maps were used to select areas for sampling during the day.

Split-beam acoustic data collection: Two EK60 echosounders (38 and 120 KHz) were used to collect water column information, as well as document bottom features indicative of hardbottom habitat. Interesting bottom features were logged using ER60 acquisition software, and GPS coordinates were extracted by mousing over specific features of the ocean bottom in georeferenced graphic displays or by processing EK60 files (*.raw) within Echoview software (v4.90).

DIDSON acoustic data collection: A DIDSON acoustic imaging sonar was mounted on the ROV and acoustic imaging data of reef fish were collected during each ROV dive.

Sponge Collection

The manipulator arm on the ROV was used to collect vase sponges opportunistically during ROV dives.

SURVEY RESULTS

ROV Sampling

32 ROV dives were completed on inshore and shelf-edge habitats totaling over 50 hours of video footage. Several dives were completed inside and adjacent to MPAs (Figure 1). Many dives were performed inshore due to inclement weather and strong currents associated with shelf-edge sites. ROV video footage was archived at the NMFS-Beaufort Laboratory for future analysis. Specifically, analyses to be conducted include:

- 1) Identify and quantify fish seen during ROV dives
- 2) Describe bottom habitats seen during ROV dives
- 3) Describe fish assemblages in relation to bottom habitats
- 4) Compare fish assemblages and bottom habitats inside and outside of Marine Protected Areas
- 5) Determine how species-specific and community metrics have changed over time for fish assemblages surveyed on shelf-edge habitats by comparing ROV and submersible video footage from current and past research surveys
- 6) Document change in the invasive lionfish species over time using current ROV and past submersible video footage

Environmental Data Collection

17 CTD profiles were collected during the cruise (Table 1). CTD data were processed with Seabird SBE Data Processing software (version 7.2) and archived in a Microsoft Access database at the NMFS-Beaufort Laboratory for future analysis.

Acoustic Data Collection

Multibeam:

16 areas were mapped using multibeam acoustic gear (Figure 3). Multibeam data were processed with Caris software on board the *Nancy Foster*. Multibeam maps were useful in selecting ROV sampling sites, i.e.,

identifying hardbottom habitats. All multibeam acoustic data were archived on a server and compiled in an Arc GIS project at the NMFS-Beaufort Laboratory for future analysis and survey planning.

Split-beam:

The EK60 echosounders recorded water column information during all multibeam mapping efforts. GPS points extracted from EK60 data were often used in conjunction with the Simrad multibeam to determine probable ROV dive sites for the following day. All EK60 acoustic data were archived on a server at the NMFS-Beaufort Laboratory for future analysis.

DIDSON:

DIDSON data were collected during all ROV dives. These data were cataloged at the NOS-CCFHR laboratory in Charleston, SC. Collaborating researchers will analyze and compare these data to the video images from the ROV and split-beam acoustic data. Specifically, analyses to be conducted include:

- 1) Quantify the size and density of fish captured in the sonar beam at each dive site
- 2) Relate fish size and density to habitat type
- 3) Compare fish length frequencies and densities among dive sites

Sponge Collection

Six vase sponges, *Ircinia campana*, were collected during ROV dives (Collection numbers: 101177, 101179, 101183, 101184, 101185, and 101186). These sponges were transferred to a collaborating researcher for oil contamination analysis.

Table 1. Summary of station coordinates, depth, date and time for each ROV dive (camera-trap, Gear=324) and CTD cast (Gear=298) conducted on the NF-10-15-Leg 2 survey.

| Collection Number | Gear | Date | Time (UTC) | Latitude | Longitude | Depth (m) |
|-------------------|------|------------|------------|----------|-----------|-----------|
| 101143 | 298 | 09/29/2010 | 15:17:00 | 30.55 | -81.15 | 18 |
| 101144 (dive 1) | ROV | 09/29/2010 | 19:04:00 | 30.55 | -81.13 | 21 |
| 101145 (dive 2) | ROV | 09/29/2010 | 21:00:00 | 30.55 | -81.13 | 21 |
| 101146 | 298 | 09/30/2010 | 00:43:00 | 30.46 | -81.22 | 16 |
| 101147 | 298 | 09/30/2010 | 08:29:00 | 30.42 | -81.19 | 18 |
| 101148 (dive 3) | ROV | 09/30/2010 | 12:21:00 | 30.43 | -81.24 | 17 |
| 101149 (dive 4) | ROV | 09/30/2010 | 14:20:00 | 30.42 | -81.22 | 21 |
| 101150 (dive 5) | ROV | 09/30/2010 | 21:09:00 | 29.74 | -80.74 | 26 |
| 101151 | 298 | 10/01/2010 | 00:27:00 | 29.74 | -80.75 | 48 |
| 101152 | 298 | 10/01/2010 | 08:08:00 | 29.17 | -80.56 | 25 |
| 101153 (dive 6) | ROV | 10/01/2010 | 15:30:00 | 29.15 | -80.23 | 54 |
| 101154 (dive 7) | ROV | 10/01/2010 | 18:32:00 | 29.31 | -80.39 | 30 |
| 101155 | 298 | 10/02/2010 | 01:46:00 | 29.98 | -80.23 | 165 |
| 101156 | 298 | 10/02/2010 | 08:35:00 | 30.02 | -80.22 | 165 |
| 101157 (dive 8) | ROV | 10/02/2010 | 11:48:00 | 29.99 | -80.28 | 65 |
| 101158 (dive 9) | ROV | 10/02/2010 | 12:48:00 | 29.99 | -80.28 | 64 |
| 101159 (dive 10) | ROV | 10/02/2010 | 16:00:00 | 30.00 | -80.28 | 52 |
| 101160 (dive 11) | ROV | 10/02/2010 | 18:55:00 | 30.01 | -80.28 | 54 |
| 101161 (dive 12) | ROV | 10/02/2010 | 21:32:00 | 30.02 | -80.28 | 60 |
| 101162 | 298 | 10/03/2010 | 08:45:00 | 29.85 | -80.29 | 58 |
| 101163 (dive 13) | ROV | 10/03/2010 | 12:25:00 | 29.88 | -80.28 | 61 |
| 101164 (dive 14) | ROV | 10/03/2010 | 14:50:00 | 29.94 | -80.28 | 61 |
| 101165 (dive 15) | ROV | 10/03/2010 | 18:02:00 | 30.06 | -80.28 | 55 |
| 101166 | 298 | 10/03/2010 | 23:37:00 | 30.39 | -80.20 | 72 |
| 101167 | 298 | 10/04/2010 | 08:04:00 | 30.45 | -80.21 | 55 |
| 101168 (dive 16) | ROV | 10/04/2010 | 11:52:00 | 30.48 | -80.20 | 56 |
| 101169 (dive 17) | ROV | 10/04/2010 | 14:20:00 | 30.44 | -80.21 | 56 |
| 101170 (dive 18) | ROV | 10/04/2010 | 16:49:00 | 30.40 | -80.22 | 54 |
| 101171 (dive 19) | ROV | 10/04/2010 | 20:09:00 | 30.37 | -80.22 | 59 |
| 101172 | 298 | 10/05/2010 | 00:28:00 | 30.39 | -80.21 | 67 |
| 101173 | 298 | 10/05/2010 | 18:52:00 | 32.22 | -79.88 | 23 |
| 101174 (dive 20) | ROV | 10/05/2010 | 20:32:00 | 32.22 | -79.88 | 26 |
| 101175 | 298 | 10/06/2010 | 04:34:00 | 32.32 | -79.07 | 22 |
| 101176 (dive 21) | ROV | 10/06/2010 | 11:51:00 | 32.40 | -79.00 | 59 |
| 101177 (dive 22) | ROV | 10/06/2010 | 14:20:00 | 32.34 | -79.05 | 55 |
| 101178 (dive 23) | ROV | 10/06/2010 | 16:44:00 | 32.34 | -79.04 | 60 |
| 101179 (dive 24) | ROV | 10/06/2010 | 21:05:00 | 32.27 | -79.17 | 53 |
| 101180 | 298 | 10/07/2010 | 02:24:00 | 32.08 | -79.42 | 48 |
| 101182 | 298 | 10/07/2010 | 09:19:00 | 32.01 | -79.44 | 48 |
| 101183 (dive 25) | ROV | 10/07/2010 | 12:29:00 | 32.15 | -79.28 | 51 |

| Collection Number | Gear | Date | Time (UTC) | Latitude | Longitude | Depth (m) |
|-------------------|------|------------|------------|----------|-----------|-----------|
| 101184 (dive 26) | ROV | 10/07/2010 | 15:23:00 | 32.04 | -79.43 | 51 |
| 101185 (dive 27) | ROV | 10/07/2010 | 18:04:00 | 32.03 | -79.44 | 56 |
| 101186 (dive 28) | ROV | 10/07/2010 | 21:52:00 | 31.96 | -79.50 | 52 |
| 101188 | 298 | 10/08/2010 | 04:45:00 | 31.58 | -79.71 | 61 |
| 101189 (dive 29) | ROV | 10/08/2010 | 12:31:00 | 31.54 | -79.73 | 66 |
| 101190 (dive 30) | ROV | 10/08/2010 | 14:13:00 | 31.53 | -79.74 | 60 |
| 101191 (dive 31) | ROV | 10/08/2010 | 18:35:00 | 31.21 | -79.89 | 52 |
| 101192 (dive 32) | ROV | 10/08/2010 | 20:29:00 | 31.25 | -79.88 | 48 |
| 101193 | 298 | 10/08/2010 | 22:03:00 | 31.30 | -79.87 | 44 |

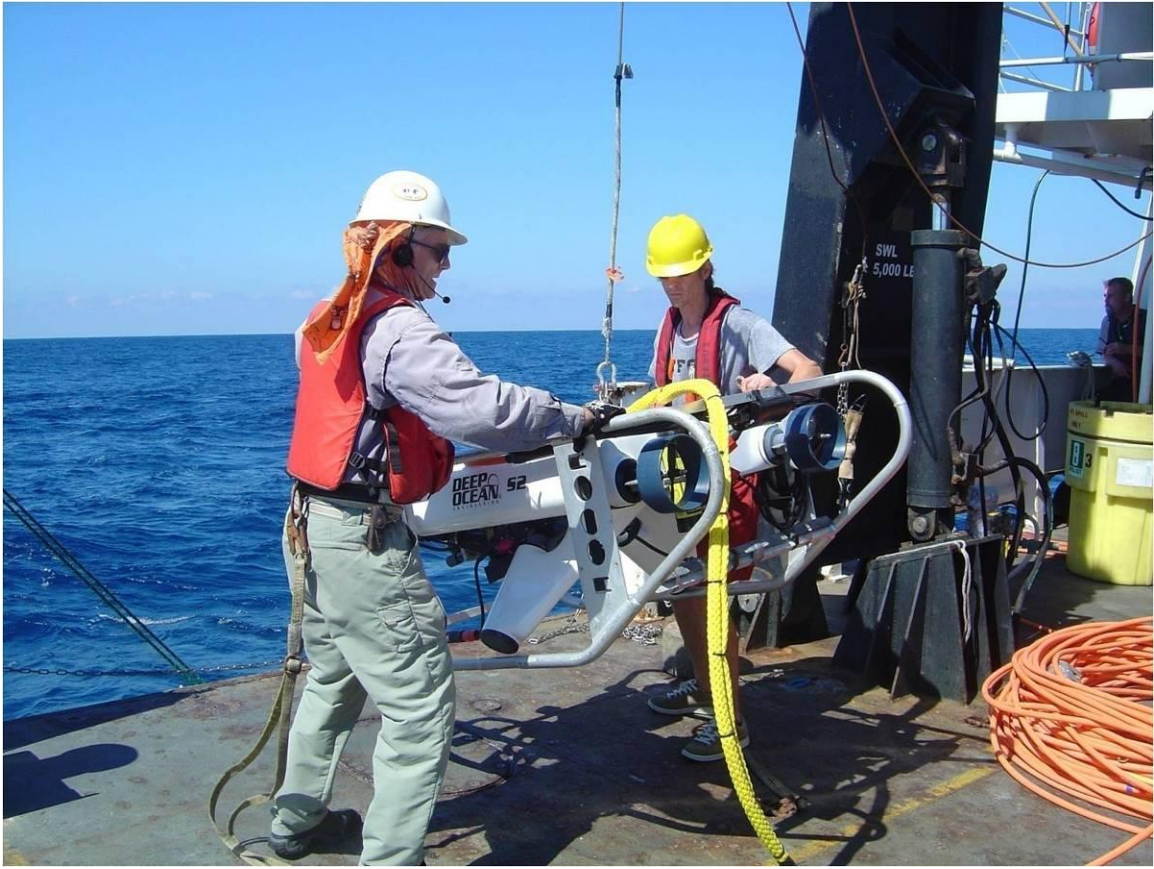


Figure 1. ROV (Super Phantom S2) used on continental shelf and shelf break habitats during the research cruise NF-10-15-Leg 2.

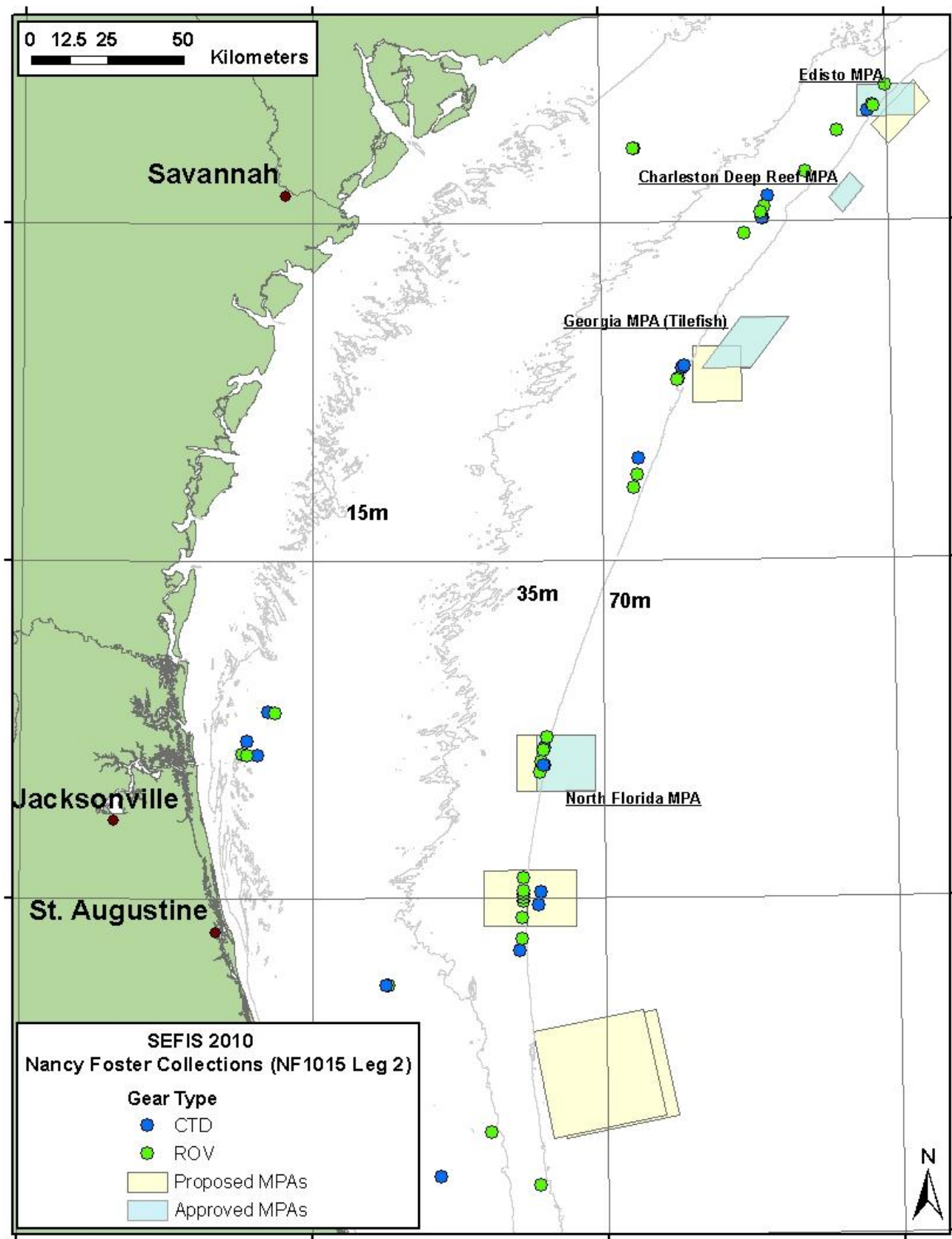


Figure 2. Locations of ROV dives and CTD profiles conducted on the NF-10-15-Leg 2 survey. Note that symbols overlap in many cases.

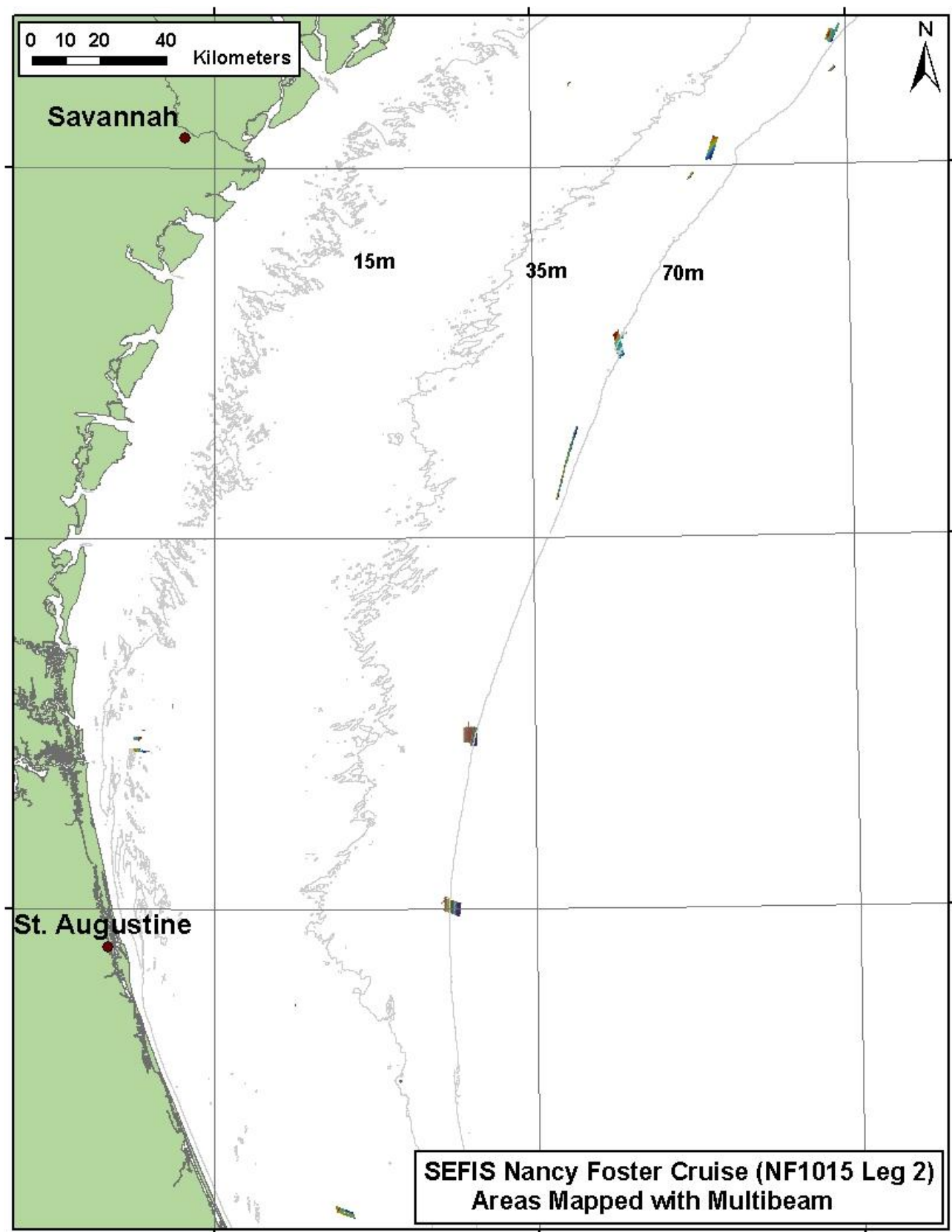


Figure 3. Locations mapped with multibeam acoustic gear on the NF-10-15-Leg 2 survey.

Leg 2 (26 September – 9 October 2010)

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